SUPPORTING ENTERPRISES IN SEARCH OF COMPETITIVENESS: THE CASE OF THE CASHEW NUT

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ABSTRACT - This paper evaluates the effect of Brazil's cashew nut processing technology on product quality and price, offering suggestions to improve the processing industry's competitive strength. The industry's position in the global whole and broken cashew nut market was analyzed using an index of competitiveness in quality and an index of competitiveness in price. According to the analyses, cashew's processed through use of a semi-automated production system were much more globally competitive in comparison to the nuts processed using a completely automated system. In this study, 15 processing stages that affect the whole and broken cashew nut industry's costs and product quality were identified.

Key-words: Cashew nut, quality competitiveness, price competitiveness.

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INTRODUCTION

Today, the cashew nut agribusiness has a very relevant economic and social position in Brazil's Northeast Region. Cashew exports in 1996 were US$ 167.50 million, and the domestic cashew market added another 10% of this total in value. This agribusiness is the region's third largest exporter and the State of Ceará's largest exporter (Leite, 1994). Cashews are responsible for 35, 700 field jobs and more than 20,000 industrial processing jobs (Paula Pessoa et al., 1995).

Exported cashews are mostly peeled and semi-toasted. They are considered a "basic product" in international trade legislation. Since consumers consider cashews to be a luxury item, they are exported to countries with high per-capita incomes (França, 1988). European consumers in particular have a predisposition for this type of exotic product (CACEX, 1985). In many other areas of the world, cashews compete with other types of local nuts. The unanimous acceptance of the Brazilian cashew is due to its high quality and its low price relative to Indian cashew.

The cashew is currently economically import both for its export value and as a generator of employment. There exist many possibilities for expanding its market through technological improvement and other innovations.

The disorganized productive chain found in Brazil's cashew industry is one of the main non-technological impediments to improving the chain's competitive position. Unilateral planning within the productive chain induces an inconstant relationship between the agricultural and industrial segments, causing unproductive conflict. Because of this, technological innovation is much less productive than if introduced into more harmonious environment. Therefore, mechanisms that motivate and promote multilateral articulation need to be employed to direct the components of the productive chain toward common agreement on their mutual objectives, directed primarily toward efficiently and profitably meeting the desires of the product's final consumers.

Regarding technological gaps, Leite (1994) and Paula Pessoa et al (1995) determine that the low productivity of whole nut processing is one of the main obstacles to improving Brazil's cashew agribusiness'

competitive position. The price differential between whole and broken cashews indicates that the consumer's consider nut integrity of value, possibly as a mark of quality. In spite of this evidence, industrial processing in Brazil leaves only 55% of the nuts whole, while in India, Brazil's largest cashew export competitor, 85% of the nuts remain whole (Leite, 1994). In order to overcome this technological deficiency, the Brazilian Agribusiness Research Company (EMBRAPA) working together with the Nutritious Products Company of the Northeast (COPAN) and the entrepreneur Francisco Alves Chagas, developed an alternative system to process cashews. The high index of whole nuts obtained after using this processing system, around 85%, show that the system can significantly contribute to increase industry profits.

Brazil's cashew processors are either very large companies, which use automated systems and export almost all their production, or small processing companies, using semi-automated systems and supplying most of the internal market. The large established processors use capital intensively, while the small companies are labor intensive. According to specialists in this field, the external market has a preference for whole nuts physical of a specific color and flavor, preferences which can be used as a production guide for export companies and to develop the internal market. One great advantage the semi-mechanized system has over the automated one is that this system requires only minimal capital.

In the current context of increased competition for resources and markets, businesses are looking for more creative forms of resource management and increased flexibility and responsiveness to market opportunities. In that respect, Paula Pessoa & Leite (1997) affirm that it is very important to define, create, adapt, improve, and adjust the systems and techniques of production to make them compatible with the desires of customers and final consumers. Ostrenga et. al., (1994) point out that the companies that quickly placed their products in the market, products in conformity with the consumer's desires, achieved excellent economic returns.

In the case of the cashew nut, identification of the factors that determine quality in the mind of the consumer is critical. Once this identification is accomplished, the cashew nut agribusiness can create a

new pattern of quality to meet, and in some instances form, market desires. This will require a coordinated effort within the agribusiness segment, but will lead to increased consumption of more value added product, improved competitiveness, and contribute the Northeast region's socioeconomic development.

OBJECTIVES

The general objective of this paper is to evaluate the competitiveness and the possibilities of competitive improvement in the cashew nut agribusiness sector; specifically, it is intended:

a) To evaluate the quality and price competitiveness of cashew nuts (whole and broken) processed by two different systems (semi-automated and automated);
b) to estimate competitiveness indexes for the cashew nut (whole and broken) processed by the two different systems(semi-automated and fully automated); and
c) to identify which stages of the cashew nut processing, both semi-automated and automated, can be most easily improved upon to meet market demands.

[From the following section to the "Results and Discussion" section, this paper is in its original, unrevised English.]

METHODOLOGY

Data Sources

The data for this research was taken from specialist survey: four EMBRAPA researchers and three cashew nut (CN) businessman. The interviewee selection was based on the their experience and knowledge on the researched subjects. Due to lack of time and resources, it was not possible to accomplish the interviews along the consumers.

Nevertheless, the interviewees hold much experience, either in the technical area and in the consuming market, so they constitutes information sources that portray the market aspirations.

Analysis methods

Agricultural products or agribusiness can be classified in two categories: commodities or specialities. The commodities are standardized products in international trade, with delivery dates and storage provisions previously set up between buyer and salesperson. The products include the soy grains, corn, wheat, and prices are fixed by the market. Thus, the reduction of costs through scale economies and the improvement of quality constitute a means to enter and stay in the market.

The specialities are differentiated products, just like the organic and diet products. In this case, the value noticed by the customer allows a certain freedom in the price formation on the part of the producer/ processor, since, theoretically, exists willingness to pay (DAP)[5] .

Starting from those considerations, the price formations of the commodities and specialities can be expressed by the following way:

a) product Commodity

P(Market)= C (Costs) + ML (markup) (1)

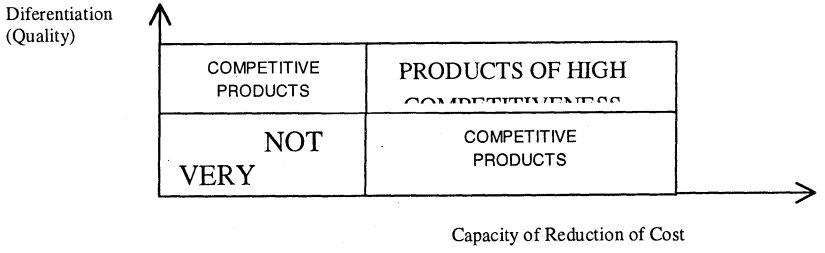
b) product Speciality

P (Market) = C + ML+ ΔP (Value attaché with the differentiation) (2)

On the other hand, the Graph 1 (adapted of Araújo et al.,1996) shows some competitive strategies, through reduction of cost and/or increase of quality/differentiation of the product.

[5]DAP (Willingness to pay) understood as the amount of money one is willing to pay for the gain in quality.

Graph 1 - Competitiveness through cost reduction strategies and/or product differentiation by quality



As general rule, commodities are naturally associated to the scale gains. The cost factor is the central element of competition. Yet, the specialities products may be quality differentiated. Thus, the competitiveness emerges from the ability or capacity of differentiating products and of reducing costs.

According to Paula Pessoa & Leite (1997), the implementation of a strategy of costs reduction and/or qualitative differentiation of products, according to the market desires, it is essential for the managerial success.

Nevertheless the strategic importance of the quality in the dispute for markets, the value noticed by the customer in relation to a product is determined by the appropriate balance of the binomial quality and price. With regard to that, Gale (1996) mentions the Cadillac example, that lost a great part of the market while getting good grades from the consumers about the quality of its products. It is believed that it must have happened due to its competitor who has presented, in the perception of the market, products with a better combination among the quality attributes and of price.

To know the desires of the market with regard to the quality and price of a product, constitutes for the decision making one an information of great strategic relevance in the construction of competitive advantages.

In the present study, the assistance to the construction of competitive advantages in the cashew agribusiness were obtained through

indexes of competitiveness (Paula Pessoa & Leite,1997). To the cashew nut (CN), the analysis of the global competitiveness was made through the index of competitiveness of quality and the index of competitiveness of price.

To help the implementation of competitive improvements through strategies of reduction of cost and/or improvement of quality of CN, the methodology proposal was used by Paula Pessoa & Leite (1997).

Index of Global Competitiveness (ICG).

The satisfaction level noticed by the market is expressed by the Index of Global Competitiveness (ICG), it helps to show if the analyzed product is more or less competitive than the concurrent product.

ICG will be obtained by the following way:

ICG = (ICQ x IRQ) + (ICP x IRP), where: (3)

ICQ = Index of Competitiveness in Quality;
IRQ = Relative Importance of the Quality;
ICP = Index of Competitiveness in Price;
IRP = Relative Importance of the Price.

a) Relative Importance of the Quality (IRQ) and Relative Importance of the Price (IRP).

It basically consists of obtaining from the specialists the Relative Importance of the Quality (IRQ) and the Relative Importance of the Price (IRP) in the purchase decision of each product type.

b) Index of Competitiveness in Quality (ICQ).

This index enable to identify and prioritize the more important quality attributes of a product. It also allows to identify in which of those attributes the competitive products present better performance.

The procedure to build this index consists of the following:

1. to identify the quality attributes. It means to get from the specialists a list of the main quality attributes of the studied product;
2. to prioritize the quality attributes. It means to request the specialists to

weigh the main quality attributes. They may distribute 100 points among the attributes related to quality, in agreement with their importance;

3. Indexes of Attributes Performance (IAP's): to ask to the specialists to evaluate each product scoring from 1 up to 10, related to the main quality attributes. The scores obtained in each attribute, so much for the product analyzed (A) as for the concurrent product (B), may be divided (A/B). This division will supply IAP's of the product analyzed in relation to the concurrent product;
4. Index of Competitiveness in Quality (ICQ): to multiply the weighted values given in the step 2 by the respective IAP's. The results may be divided by 100. The sum of these results end up the ICQ of the product analyzed related to the concurrent product.

c) Index of Competitiveness in Price (ICP).

This index is important, because the price element has, in many products, a fundamental role in the purchase decision. It is build as following: to obtain from the specialists the satisfaction level (scores from 1 to 10) related to the price of the products analyzed. To dived the score of the product analyzed by the score obtained for the concurrent. The result will be the ICP.

Competitive Improvement

It consists, basically, of quantifying the importance of each stage of the productive process in the cost and quality of the final product.

The application depends essentially on the following steps:

1. to identify the quality attributes or to get from the specialists a list of the main quality attributes of the studied product;
2. to prioritize the quality attributes or to ask the specialists to weigh the main attributes distributing 100 points among the attributes related in the previous step;
3. to quantify the influence of the stages of the productive process over the attributes. The specialists may distribute 100 points, according to the degree of influence of the stages in each attribute;
4. to multiply each weighted attribute by the respective degrees of

influence of each stage of the productive process. The obtained results are the values of each stage (in absolute values). These values can be expressed in a relative way, indicating the influence of each stage in all the considered quality attributes.

Regarding the cost, were obtained the share of each stage in the processing cost, being the data supplied by the companies (the big and the small industry).

RESULTS AND DISCUSSION

Indexes of whole and broken cashew nut competitiveness

Table 1 shows the whole cashew nut Indexes of Performance Attributes [quality] (IAP's) gathered from the semi-automated and the automated processing systems.

These whole cashew quality attributes were weighed as follows: color 51%, flavor 49%. Based on the attributes weighting and scores, the IAP's showed that whole cashews processed using the semi-automated system were superior in all quality attributes. Semi-automated processing produced nuts with 22% better color and 17% better flavor than the automated system.

Table 1 - Indexes of whole cashew nut Performance Attributes [quality] (IAP's): semi-automated and automated systems

Main Attributes	Weighting (%)	Scores		IAP (A/B)
		System semi-automated (A)	System automated (B)	
Color	51	7,80	6,40	1,22
Flavor	49	8,20	7,00	1,17

Source: Research data.

Table 2 presents the broken cashew nut Indexes of Attributes Performance (IAP's) for the semi-automated and the automated processing systems.

The broken cashew quality attributes were weighed, with flavor determining 53% of quality and color 47%. IAP's evidenced the superiority of broken cashew nuts produced by the semi-automated system in all quality attributes. The semi-automated system produced cashews with around 19% better color and 15% better flavor.

Table 2 - Indexes of broken cashew nut Performance Attributes [quality] (IAP's): semi-automated and automated systems

Main Attributes	Weighting (%)	Scores		IAP (A/B)
		System semi-automated (A)	System automated (B)	
Color	47	7.60	6.40	1.19
Flavor	53	7.80	6.80	1.15

Source: Research data.

Tables 3 and 4 compare the two different processing systems' Global Indexes of Competitiveness (ICG's) for whole and broken cashew nuts. The Global Indexes were constructed using the Index of Competitiveness in Quality (ICQ), the Index of Competitiveness in Price (ICP), the Relative Importance of Quality (IRQ), and the Relative Importance of Price (IRP).

Using the semi-automated system, ICQ equals 1.36 (Table 3), which means that the quality of whole cashew processed by that system is 36% superior compared to the whole cashew processed using the automated system. The semi-automated processing system's ICP equals 1.39, indicating that whole cashews processed using that system present 39% greater price satisfaction than those processed using the automated system. The Global Index of Competitiveness, based on a combination of the ICQ, the ICP, and relative importance weighting of 63% for quality and 37% for price, showed that whole cashews processed using the semi-automated system are 37% superior in competitiveness and quality to those produced by the automated system.

Table 3 - Whole cashew nut Indexes of competitiveness: semi-automated system and automated systems

Systems of Processing	Index of Competitiveness in Quality (ICQ)	Index of Competitiveness in Price (ICP)	Index of Competitiveness Global (ICG)
Semi-automated	1,36	1,39	1,37
Automated	0,78	0,78	0,78

Source: Research data.

Broken cashews produced using the semi-automated system (Table 4) had an ICQ of 1.28, evidencing that the quality of the cashew processed using this system is 28% superior when compared to the quality of the cashew processed using the automated system. The semi-automated system's ICP equals 1.20, which is another indication of the competitive superiority of the semi-automated system. The final product produced by the semi-automated system presents a 20% more satisfactory price. Regarding the relative importance of quality and price, a weighting of 56% was assigned for quality and 44% for price. ICG was estimated at 1.24, indicating that broken cashews resulting from processing using the semi-automated system are 24% superior to the ones processed using the automated system.

Table 4 - Broken cashew nut Indexes of competitiveness: semi-automated and automated systems

Systems of Processing	Index of Competitiveness in Quality (ICQ)	Index of Competitiveness in Price (ICP)	Index of Competitiveness Global (ICG)
Semi-automated	1.28	1.20	1.24
Automated	0.84	0.86	0.85

Source: Research data.

Competitive Improvement of semi-automated cashew nut processing system.

The relative influence of each stage of semi-automated processing on cashew nut quality attributes is shown in Table 5.

Among the quality attributes (Table 5), physical integrity determines 52.50% of the product's quality and is affected mainly at stages 9 (cut and remove peel--20.88% weighting), 14 (mechanically remove peel--20.09% weighting), and 15 (hand remove peel--11.10%wighting). Color determines 27.50% of the product's quality and is mainly affected at stages 10 (heating the cashew--23.68% weighting), 17 (frying--17.88% weighting), and 11 (moistening--14.93% weighting). Flavor is responsible for 20% of the product's quality and it is most influenced at stages 17 (frying--19.08% weighting), 11 (moistening--16.22% weighting), and 3 (sun drying and nut pre-cleaning--10.48% weighting).

Table 5 - Cashew nuts processed using the semi-automated system: relative influence of each processing stage on quality attributes

Stages of the Productive Process	Attributes of Quality		
	Physical integrity	Color	Flavor
Et1 - Inspection	4.18	4.21	4.95
Et2 - Weighing	0.50	0.00	0.00
Et3 - Drying in the sun and pre-cleaning (chestnut only)	3.03	5.21	10.48
Et4 - Classification or calibration	6.32	0.00	3.70
Et5 - Packing	0.13	1.25	2.49
Et6 - Nuts Storage	1.12	5.49	6.22
Et7 - Baking	5.16	6.74	2.24
Et8 - Rest	2.41	1.75	2.50
Et9 - Cuts and remove peel	20.88	1.25	2.50
Et10 - Heater	8.07	23.68	7.96
Et11 - Moisten	5.24	14.93	16.22
Et12 - Pre-heater	3.16	4.96	2.24
Et13 - Rest	1.46	1.50	1.75
Et14 - Mechanical remove peel	20.09	2.98	1.99
Et15 - Hand remove peel	11.10	4.68	1.50
Et16 - Classification	2.78	0.50	2.00
Et17 - Fry	1.37	17.88	19.08
Et18 - To impart a centrifugal movement to	1.00	0.75	1.50
Et19 - Salting	0.25	0.99	6.96
Et20 - Packing	1.75	1.25	3.72
Total	100.00	100.00	100.00
Attributes weighted (%)	52.50	27.50	20.00

Source: Research data.

Table 6 presents the value added and production cost arising from each stage of semi-automated nut processing, by percentage of

total added value and total production cost.

Stages 9 (cuts and removes the peel), 10 (heat the nut), 11(moistening), 14 (mechanically remove peel) and 17 (frying) together determine 54.37% of the value added to the nut. Processing costs are most affected at stages 1 (inspection), 9 (cuts and remove the peel), 15 (hand remove peel) and 16 (classification), which together are responsible for 58.04% of cashew nut processing costs.

Table 6 - Cashew nuts processed using the semi-automated system: value added and processing costs by stage

Stages of the Productive Process	Value added (%)	Processing Cost (%)
Et1 - Inspection	4.51	9.49
Et2 - Weighing	0.30	1.74
Et3 - Drying in the sun and pre-cleaning (chestnut only)	4.80	3.74
Et4 - Classification or calibration	4.25	4.74
Et5 - Packing	1.06	1.86
Et6 - Nuts Storage	3.46	2.36
Et7 - Baking	5.20	2.99
Et8 - Rest	2.17	0.74
Et9 - Cuts and remove the peels	11.30	16.83
Et10 - Heater	12.73	3.48
Et11 - Moisten	10.08	1.50
Et12 - Pre-heater	3.55	0.92
Et13 - Rest	1.52	0.67
Et14 - Mechanical remove peel	10.91	4.94
Et15 - Hand remove peel	7.54	18.92
Et16 - Classification	1.93	12.80
Et17 - Fry	9.35	7.38
Et18 - To impart a centrifugal movement to	1.15	1.36
Et19 - Salting	1.92	0.92
Et20 - Packing	2.27	2.62
Total	100.00	100.00

Source: Research data.

Competitive Improvement of the automated cashew nut processing system.

Table 7 shows the relative influence of each stage in the automated processing system on the attributes of cashew quality. For the most part, large cashew nut processors use the automated system;

and almost all their production is exported. The frying, centrifuging, and salting stages are not used to process cashew nuts for export.

Physical integrity represents 45% the product's quality and is influenced mainly at stages 16 (selection and classification--23.25% weighting), 10 (cuts--15.51% weighting), 7 (moistening--9.20% weighting), and 13 (rest--8.34% weighting). Color represents 35% of the product's and is influenced mainly at stages 7 (moistening--21.81% weighting), 1 (storage--14.61% weighting), and 8 (auto-cudgel--9.20% weighting). Flavor represents 20% of the products quality and is influenced mainly at stages 1 (storage--27.63% weighting), 7 (moistening--13.82% weighting), and 8 (auto-cudgel--9.21% weighting).

Table 7 - Cashew nuts processed using the automated system: relative influence of each processing stage on quality attributes

Stages of the Productive Process	Attributes of Quality		
	Physical Integrity	Color	Flavor
Et1 - Storage (field level)	1.00	14.61	27.63
Et2 - Inspection	1.00	2.42	2.42
Et3 - Weighing	1.00	2.00	2.00
Et4 - Drying and pre-cleaning (chestnut's only)	1.50	4.10	2.84
Et5 - Classification	3.60	4.10	2.84
Et6 - Weighing	2.76	4.60	4.60
Et7 - Moisten	9.20	21.81	13.82
Et8 - Auto-cudgel	4.34	9.20	9.21
Et9 - Classification	6.44	4.60	4.60
Et10 - Cuts	15.51	3.34	3.34
Et11 - Peel Pressing	4.60	4.60	4.60
Et12 - Heater	4.34	6.10	4.42
Et13 - Rest	8.34	5.42	5.00
Et14 - Remove peel (r vibration)	3.68	3.68	3.68
Et15 - Remove peel (with compressed air)	3.68	3.00	3.00
Et16 - Selection and classification	23.25	3.42	3.00
Et17 - Packing	5.76	3.00	3.00
Total	100.00	100.00	100.00
Attributes Weightings (%)	45.00	35.00	20.00

Source: Research data.

Table 8 shows the value added and processing costs arising from each stage of the automated processing system, by percentage of total added value and total production costs.

Stages 1 (storage), 7 (moistening), 10 (cuts), and 16 (selection and classification) determine 46.50% of the nut's quality. Stages 5 (classification) and 16 (selection and classification) are responsible for 42.92% of processing costs.

Table 8 - Cashew nuts processed using the automated system: value added and processing cost by stage

Stages of the Productive Process	Added Value (%)	Processing Cost (%)
Et1 - Storage (at field level)	8.04	2.92
Et2 - Inspection	1.87	2.00
Et3 - Weighing	1.70	2.00
Et4 - Drying and pre-cleaning (chestnut only)	2.56	4.91
Et5 - Classification	3.82	7.92
Et6 - Weighing	3.80	4.58
Et7 - Moisten	13.44	3.00
Et8 - Auto-cudgel	6.74	3.00
Et9 - Classification	5.41	4.58
Et10 - Cuts	9.89	7.09
Et11 - Pressing of the peel	4.60	4.58
Et12 - Heater	5.03	4.42
Et13 - Rest	6.38	2.50
Et14 - Remove peel (vibration)	3.68	4.58
Et15 - Remove peel (with compressed air)	3.71	2.50
Et16 - Selection and classification	15.13	35.00
Et17 - Packing	4.20	4.42
Total	100.00	100.00

Source: Research data.

CONCLUSIONS ARE SUGGESTIONS

This evaluation of the competitiveness of Brazil's cashew nut agribusiness and the quality of its product should provide important information to increase the international market share of Brazilian cashews.

The Index of Competitiveness in Quality (ICQ) shows that cashews, either whole or broken, were found to be of superior quality when processed using a semi-automated system. The Index of Competitiveness in Price (ICP) showed that cashews processed using a semi-automated system were also more price competitive. Based on these results, it was concluded that the semi-automated system offers

competitive advantages over the automated system for processing whole or broken cashew nuts.

Evidence was found that the semi-automated cashew processing system would deliver nuts of better quality if the following stages were improved: stage 9 (cuts and remove peel), stage 10 (heating), stage 11 (moistening), stage 14 (mechanically remove the peel) and stage 17 (frying). Production costs could be reduced if some of the processing stages were more efficient because their cost to value added ratio is very high: stage 1 (inspection), stage 9 (cuts and remove the peel), stage 15 (hand removing peel), and stage 16 (classification).

Efforts to improve the competitive quality of cashew nuts processed using the automated system should focus on processing stages 1 (storage), 7 (moistening), 10 (cuts), and 16 (selection and classification). Efforts to reduce processing costs should focus on stages 5 (classification) and 16 (selection and classification).

Globalization has led to increased competition for markets; competition that can met by increased productivity and improved product quality. Every company hoping for success must respond to the consumers' desires and produce goods that people want.

For the Brazilian cashew nut industry to not only survive but to expand in the international marketplace, there must be an awareness of consumer desires and efficient productive methodology put in place to meet those desires. Thus, an evaluation of the competitiveness and of the possibilities of competitive improvement in the Brazilian cashew nut industry is of extreme socioeconomic importance, especially in the country's Northeast.

In summary, cashew nut agribusiness companies must focus their attention on quality and costs without neglecting other strategic variables. The philosophy should be: Focus on the Customer; that must be the permanent concern of any company that plans to prosper. In this way, a pioneering way for Brazil, we hope to be contributing to the strategic planning of Brazil's cashew nut agribusiness.

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